

[JP,2003-161828,A]

Japanese (PDF)

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FULL CONTENTS CLAIM + DETAILED DESCRIPTION  
TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION  
TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF  
DRAWINGS DRAWINGS

[Translation done.]

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**Notes:**

1. Untranslatable words are replaced with asterisks (\* \*\* \*).
2. Texts in the figures are not translated and shown as it is.

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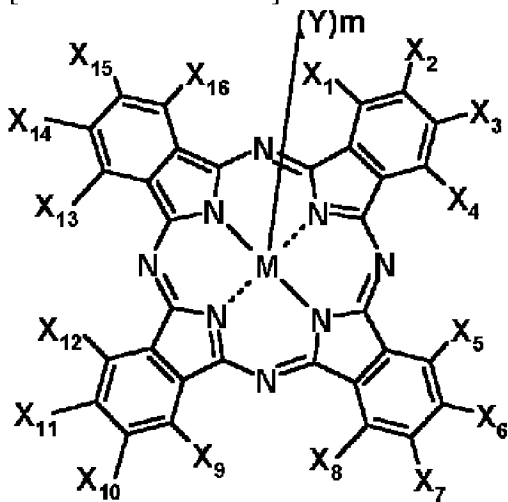
Dictionary: Last updated 04/14/2009 / Priority: 1. Chemistry / 2. Electronic engineering /  
 3. Manufacturing/Quality

**CLAIM + DETAILED DESCRIPTION**

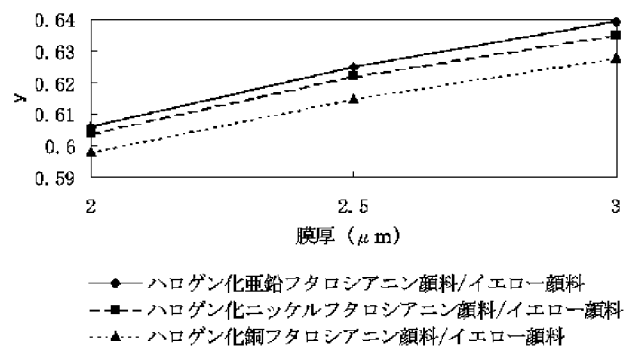
[Claim(s)]

[Claim 1] A pigment dispersion constituent for light filters containing halogenation metal phthalocyanines (A) denoted by a following general formula, and a yellow pigment (B).

[Chemical formula 1]



(M expresses aluminum, Si, Ti, V, Fe, Co, nickel, Zn, Ga, germanium, Y, Zr, Nb, In, Sn, or Pb among a formula.) X<sub>1</sub> - X<sub>16</sub> express hydrogen,

Drawing selection **Drawing 1**

[Translation done.]

fluorine, chlorine, bromine, or iodine. When either  $X_1 - X_{16}$  are each atom of fluorine, chlorine, bromine, or iodine, they may all be atoms which are different even if it was the same atom, the number is 8-16 and the remainder is a hydrogen atom. Y expresses fluorine, chlorine, bromine, iodine, or oxygen, and m expresses an integer of 0-2.

[Claim 2]The pigment dispersion constituent for light filters according to claim 1 whose combination rates of a yellow pigment (B) are said halogenation metal phthalocyanines (A) and 10 to 60% of the yellow pigment (B) sum total mass.

[Claim 3]The pigment dispersion constituent for light filters according to claim 1 whose mean particle diameter of a primary particle of said halogenation metal phthalocyanines (A) and a yellow pigment (B) is both 10-100 nm.

[Claim 4]A pigment dispersion resist for light filters containing a pigment dispersion constituent for light filters indicated to Claim 1.

[Claim 5]A light filter having on a substrate a cured film layer of a pigment dispersion resist for light filters indicated to Claim 4.

#### [Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the pigment dispersion constituent for light filters, the pigment dispersion resist for light filters, and the light filter that has a cured film layer of this pigment dispersion resist for light filters on a substrate.

[0002]

[Description of the Prior Art]In a transmission type, so that the three primary colors of red, green, and a blue light may be penetrated alternatively, [ on the substrate which provided the protection-from-light thin film layer of the network state to which a light filter is called a black matrix ] The cured film layer of the coloring composition equivalent to each color is formed into each network of a black matrix, and the network of each of this color is made to arrange regularly so that the three primary colors of the color of cyanogen, Magenta, and yellow may be reflected alternatively in a reflection type. Hereafter, the thing of the network of the above-mentioned black matrix is only called "pixel."

[0003]The light filter is used for color displays, such as a color individual image sensor, a liquid crystal color display, a color CRT. In small color liquid crystal displays, such as the conventional notebook PC and a Personal Digital Assistant, since power-saving was thought as important, transparency was required especially of the light filter, but a use is diversified and it came to be used for a color monitor, a color television, etc. in recent years. Enlargement of the color liquid crystal display panel is attained simultaneously with this. In addition to the conventional transparency, under such a background, improvement in reliability, such as color reproduction nature, a heat-resisting property, lightfastness, and chemical resistance, has come to be required more also of a light filter.

[0004]In order to satisfy this demand, the "staining technique" with which the manufacturing method of a light filter also uses a color as a

colorant in the first stage was in use, but the "pigment dispersion method" which uses the pigment which is excellent in a heat-resisting property, lightfastness, chemical resistance, etc. these days is in use. [ the coloring composition which used the dispersant into binder resin and distributed the pigment ] After applying on a substrate the optical hardenability coloring composition which added the photopolymerization nature monomer and the photopolymerization initiator, drying it and exposing through a photomask, the photolithographic method which anchors the coloring pattern produced by developing negatives is generally performed widely.

[0005]Generally as a colorant used in order to form the green picture element of a light filter, the copper halide phthalocyanine pigment which is a derivative of copper phthalocyanine is used widely. Copper phthalocyanine is a polycyclic aromatic ring compound which has four isoindole structures around a copper atom. This polycyclic aromatic ring has a total of 16 replaceable hydrogen atoms with the halogen atom etc.

Copper halide phthalocyanine substitutes some or all of the 16 above-mentioned hydrogen atoms that copper phthalocyanine has with a halogen atom, and the mixture of the copper halide phthalocyanine from which the halogenation rate differed variously is used as a green pigment.

[0006]The high green of transparency with strong yellow is required of the green picture element part of a light filter. In the case of copper halide phthalocyanine, bromine is used as halogen, and it is known that the strong green of yellow will be obtained, so that a bromination rate is high. However, a tint -- redness will become strong -- is unstable in this case, and also there was a problem of transparency falling. Recently, the color liquid crystal display which is the greatest use of a light filter comes to be used for a color monitor or a color television, and, in addition to the conventional demand characteristics, a color liquid crystal display also came to be called on for "color reproduction nature." Although what has transparency high color purity and the depth of shade and high is demanded also of the colorant used for a light filter by having come to use a light filter also for the color CRT, It was difficult for coloring to be satisfied with unstable copper halide phthalocyanine of this demand.

[0007]

[Problem to be solved by the invention]Color purity and the depth of shade of this invention are high in a green picture element part, and it makes it a technical problem at it to provide the pigment dispersion constituent added to the light filter and this pigment dispersion resist which have a cured film layer of the pigment dispersion resist excellent in transparency, and this pigment dispersion resist.

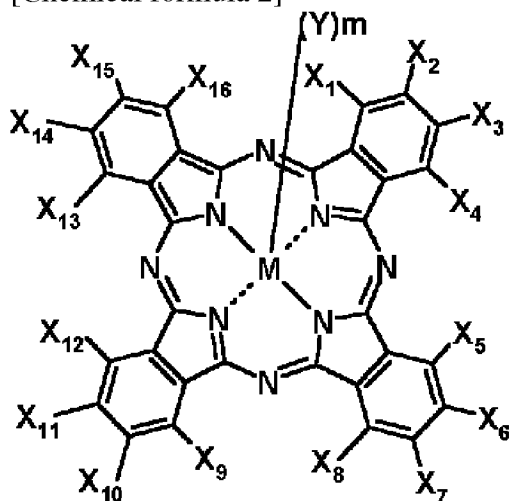
[0008]

[Means for solving problem]The pigment dispersion constituent for light filters in which this invention contains the halogenation metal phthalocyanines (A) denoted by a following general formula, and a yellow pigment (B), The above-mentioned technical problem was solved by providing the light filter which has a cured film layer of this pigment dispersion resist for light filters on the pigment dispersion resist for light filters containing this pigment dispersion constituent, and

a substrate.

[0009]

[Chemical formula 2]



[0010](M expresses aluminum, Si, Ti, V, Fe, Co, nickel, Zn, Ga, germanium, Y, Zr, Nb, In, Sn, or Pb among a formula.)  $X_1 - X_{16}$

express hydrogen, fluorine, chlorine, bromine, or iodine. When either  $X_1 - X_{16}$  are each atom of fluorine, chlorine, bromine, or iodine, they

may all be atoms which are different even if it was the same atom, the number is 8-16 and the remainder is a hydrogen atom. Y expresses fluorine, chlorine, bromine, iodine, or oxygen, and m expresses the integer of 0-2.

[0011]

[Mode for carrying out the invention]Although this invention is explained still in detail below, "Phthalocyanine (A)" and the thing of "the pigment dispersion constituent for light filters" are written as a "pigment dispersion constituent", and the thing of "the pigment dispersion resist for light filters" is written for the thing of "the halogenation metal phthalocyanines denoted by the above-mentioned general formula" as a "pigment dispersion resist", respectively. The phthalocyanine (A) used for this invention has aluminum, Si, Sc, Ti, V, Fe, Co, nickel, Zn, Ga, germanium, Y, Zr, Nb, In, Sn, or Pb as a central metal. The cured film of the pigment dispersion resist of this invention which uses the phthalocyanine which has especially Zn or nickel also in these metal is excellent in color purity, the depth of shade, and transparency.

[0012]When the valence of the above-mentioned central metal (M) is more than trivalent, a ligand (Y) carries out coordination to M. That is, when the valence of M is trivalent and one ligand univalent in a valence is [ the valence of M ] tetravalence, two ligands univalent in a valence or one ligand divalent in a valence carries out coordination. In this invention, since a manufacturing method is simple and easy to come to hand when the valence of M is trivalent or tetravalence, the phthalocyanine (A) which makes a ligand fluorine, chlorine, bromine, iodine, or oxygen is used.

[0013]In this Description, when thickness of a green pigment dispersion resist cured film layer is fixed, what has large y value of CIE coloring system chromaticity (Y, x, y value) is said color purity is "high." When

the thickness of a pigment dispersion resist cured film is decided that x and y value turn into a fixed value, what has thin thickness is said the depth of shade is "high", and what has large Y value is said transparency is "high."

[0014]Phthalocyanine (A) has 8-16 fluorine, chlorine, bromine, or iodine atoms as a halogen atom substituted by the aromatic ring. All the substituted halogen atoms may be the same, and although it may differ, it is preferred to have eight or more pieces and one or more chlorine for a bromine atom. What has 12 or more pieces and two or more chlorine atoms for a bromine atom especially has the high green of transparency, and is suitable for the green stain agent for light filters.

[0015]In the pigment dispersion constituent of this invention, phthalocyanine (A) and a yellow pigment are mixed and used at least as a colorant. By changing both mixing ratio according to a use, it can tone to a desired hue. The half band width of phthalocyanine (A) of a spectrum transmission spectrum is narrow, and its value of the maximum permeability is also larger than conventional copper halide phthalocyanine. This shows that phthalocyanine (A) assumes green with color purity and the high depth of shade, and transparency higher than conventional copper halide phthalocyanine. Specifically, [ by using phthalocyanine (A) as a colorant ] The wavelength (Tmax) from which the permeability of the spectrum transmission spectrum at 380-780 nm which was not able to be attained in conventional copper halide phthalocyanine serves as the maximum is 520-590 nm, The light filter in which the permeability of a spectrum transmission spectrum [ in / in the permeability in Tmax / not less than 70% and the wavelength of 650-700 nm ] has a green picture element which is 20% or less can be obtained that it is simple and inexpensive. Taking advantage of the feature of phthalocyanine (A), it can also be used as a pigment for mixing colors of conventional copper halide phthalocyanine.

[0016]Phthalocyanine (A) can be manufactured by the publicly known manufacturing method of halogenation metal phthalocyanines, for example, a chlorosulphonic acid method, the halogenation phthalonitrile method, etc.

[0017]Also in which manufacturing method of the above, if the obtained reaction mixture is thrown in in aqueous acids, such as water or hydrochloric acid, after termination of a reaction, the rough pigment of phthalocyanine (A) will precipitate. Although the pigment dispersion constituent of this invention may be prepared using this rough pigment as it is, Water after filtering the precipitating rough pigment, or a sodium hydrogensulfate aqueous solution, It is preferred to wash by alkaline aqueous solutions, such as a sodium hydrogencarbonate aqueous solution or a sodium hydroxide aqueous solution, and to use it if needed, drying after organic solvent cleaning, such as acetone, toluene, methyl alcohol, ethyl alcohol, and dimethylformamide.

[0018]With grinders, such as attritor, a ball mill, a vibration mill, and a vibration ball mill, carry out dry grinding of the rough pigment of phthalocyanine (A) if needed, and subsequently, By pigment-izing by the solvent salt milling method, the solvent boiling method, etc., it can be considered as the pigment which colors in the high green of yellowish transparency [ was further excellent in dispersibility or a reducing power white pigment, and ].

[0019]Although there is no restriction in particular in the pigment-ized method of a phthalocyanine (A) rough pigment, [ in this invention ] It is more preferred than the solvent boiling method which carries out heating churning of the rough pigment in a lot of organic solvents to adopt the solvent salt milling method can control crystal growth easily and pigment grains with a large specific surface area are obtained. [ as a yellow pigment (B) used for this invention ] C. I. pigment yellow . The yellow organic pigment of 83, the C.I. pigment yellow 128, the C.I. pigment yellow 138, the C.I. pigment yellow 139, the C.I. pigment yellow 150, the C.I. pigment yellow 180, and C.I. pigment yellow 185 grade is mentioned.

[0020]These yellow pigments can also be used independently, can mix two or more sorts and can also be used. Also in the above-mentioned pigment, the C.I. pigment yellow 138, the C.I. pigment yellow 139, and the C.I. pigment yellow 150 are excellent in color purity and transparency, and especially preferred.

[0021]Although it can choose suitably according to a use, the combination rate of a yellow pigment (B) is 30 to 50% of range preferably [ using phthalocyanine (A) 10 to 60% of within the limits to the sum total mass of a yellow pigment (B) ], and more preferably, when using it for a light filter generally.

[0022]Generally, the transparency of the light filter picture element part from which the particle diameter [ in / in the pigment used for a pigment dispersion resist / a dispersion state ] is obtained using this, so that it is small becomes high. Therefore, the primary particle diameter of the phthalocyanine (A) used in this invention and a yellow pigment (B) has the preferred range of 10-100 nm, and especially its range that is 30-50 nm is preferred. When the primary particle diameter of the pigment distributed in the pigment dispersion resist is over 100 nm, The transparency of the light filter picture element part which uses this falls, and when smaller than 10 nm, Since the viscosity of a pigment dispersion constituent rises temporally, thixotropy appears strongly and also it becomes easy to condense a pigment, in a dispersion state, an aggregated particle on the contrary with large particle diameter may be formed, and it becomes the cause that the transparency of a light filter picture element part falls, also in this case.

[0023]The pigment dispersion constituent of this invention uses the above-mentioned phthalocyanine (A) and a yellow pigment (B) as an essential ingredient, a dispersant, a solvent, and if needed, mixes various additives to this and prepares them to it.

[0024][ as a dispersant used for the pigment dispersion constituent of this invention ] Although the publicly known thing used for general pigment dispersion can be used and it is not limited in particular, if an example is given, Resin mold dispersants, such as the intermediate of a surface active agent and a pigment or a derivative, the intermediate of a color, a derivative or polyamide system resin, polyurethane system resin, polyester system resin, and acrylic resin, are raised. It is preferred to use the dispersant containing the acrylic polymer which has N and N-II substituted amino group and an acidic group for a principal chain or a side chain also especially in the various above-mentioned dispersants. There are "Efka 46" by "BYK-160" made from big KEMI, "BYK-161", "BYK-2001", and Efka Chemicals, "Aji Spa PB-814" by Ajinomoto

Co., Inc., etc. in the commercial item of a resin mold dispersant, for example. These dispersants can also be used combining two or more sorts, even if independent one sort.

[0025]The component of the above-mentioned dispersant, the resin used for the pigment dispersion resist of this invention, and others is dissolved in the pigment dispersion constituent of this invention, and the solvent which can distribute a pigment stably is used for it. As an example of such a solvent, for example Propylene-glycol-monomethyl-ether acetate, Acetate system solvents, such as propylene glycol monoethyl ether acetate, Propionate system solvents, such as ethoxy propionate, toluene, xylene, Aromatic solvents, such as methoxybenzene, butyl cellosolve, propylene glycol monomethyl ether, Ethers solvents, such as diethylene glycol ethyl ether and diethylene glycol dimethyl ether, Ketones, such as methyl ethyl ketone, methyl isobutyl ketone, and cyclohexanone, Lactone system solvents, such as nitrogen compound system solvents, such as aliphatic hydrocarbons, such as hexane, N, N dimethylformamide, gamma-butyrolactam, and N-methyl-2-pyrrolidone, and gamma-butyrolactone, carbamate, etc. are mentioned. These solvents can also be used combining two or more sorts, even if independent one sort.

[0026][ the above-mentioned phthalocyanine (A), a yellow pigment (B), a dispersant, a solvent, and the various additives blended if needed ] It mixes using a ball mill, a sand mill, a bead mill, 3 roll mills, a paint conditioner, attritor, a distributed agitator, or an ultrasonic dispersion machine, and a pigment dispersion constituent is prepared. As for the content of the nonvolatile matter contained in a pigment dispersion constituent, it is preferred that it is in the range of 10 - 35 mass %. As for the content of phthalocyanine (A) and the yellow pigment (B) which are contained in this nonvolatile matter, it is [ the content of 8 - 23 mass % and a dispersant ] preferred that it is in the range of 2 - 15 mass %.

[0027]The pigment dispersion resist of this invention adds an additive to the pigment dispersion constituent of this invention, the alkali solubility binder resin which has an acidic group, an optical hardenability constituent, and the mixture which consists of solvents if needed.

[0028]The alkali solubility binder resin which has an acidic group is a copolymer of the monomer which has an acidic group and an ethylenic double bond in one molecule, and other monomers. [ as a monomer which has an acidic group and an ethylenic double bond in one molecule ] (Meta) Acrylic acid, p-styrene carboxylic acid, p-styrene sulfonic acid, p-hydroxystyrene, maleic anhydride, maleic acid monoester, 2-(meta) acryloyloxyethyl phosphate, etc. are mentioned. Especially, it is preferred to use the monomer which has a carboxyl group or phenolic hydroxyl.

[0029][ in one molecule ] [ as an acidic group, the monomer which has an ethylenic double bond, and a copolymerizable monomer ] For example, methyl (meta) acrylate, ethyl (meta) acrylate, Butyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, Publicly known monomers, such as acrylic ester (meta), such as beta-hydroxyethyl (meta) acrylate and benzyl (meta) acrylate, styrene, methyl vinyl ether, vinyl acetate, vinyl chloride, N-vinyl pyrrolidone, and acrylamide, are mentioned.

Although it changes also with presentations of a comonomer, it is preferred to consider it as 20 - 250 mgKOH/g, and if the acid number of the alkali solubility binder resin which has this acidic group is 50 - 150 mgKOH/g, in addition, it is preferred.

[0030]The optical hardenability constituent used for the pigment dispersion resist of this invention contains the compound which has photopolymerization nature or an optical hardenability functional group. When using the compound which has a photopolymerization nature functional group, a photopolymerization initiator is added if needed.

[0031]The compound which has photopolymerization nature or an optical hardenability functional group is hardened by polymerizing by irradiating with ultraviolet radiation or a visible radiation, or constructing a bridge. As a typical thing of such a compound, the monomer etc. in which a radical polymerization or ionic polymerization is possible can mention a compound with publicly known all to a side chain by the optical bridge formation type photopolymer which has a cinnamic acid residue and an azido group, and light. As such a monomer, for example Methyl (meta) acrylate, Ethyl (meta) acrylate, butyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, [ besides the monomer of one organic functions, such as beta-hydroxyethyl (meta) acrylate, ] Trimethylolpropane bird (meta) acrylate, bird methylol pro pansy (meta) acrylate, Neopentyl glycol di(metha)acrylate, pentaerythritol tetra (meta) acrylate, The monomer of many organic functions, such as pentaerythritol bird (meta) acrylate, dipentaerythritol hexa (meta) acrylate, and dipentaerythritol penta (meta) acrylate, is mentioned.

[0032]In this invention, also in the above-mentioned monomer, trimethylolpropane bird (meta) acrylate, Pentaerythritol tetra (meta) acrylate, dipentaerythritol hexa (meta) acrylate, dipentaerythritol penta (meta) acrylate of moreover using a volatile low thing by many organic functions, etc. are preferred. Using independently can also use these monomers for two or more sorts, mixing.

[0033]The combination rate of the compound which has photopolymerization nature or an optical hardenability functional group has the preferred range of 25 - 150 mass % to alkali solubility binder resin. Even if the compound itself which has photopolymerization nature or an optical hardenability functional group is insoluble to an alkali, This is mixed with alkali solubility binder resin with a pigment dispersion constituent, When a photopolymerization initiator is furthermore added if needed, a pigment dispersion resist is prepared and it is used for the photolithographic method, the portion with which the ultraviolet radiation or visible light of this pigment dispersion resist paint film was irradiated carries out optical hardening, and become insoluble at an alkali developing solution, but. Dissolution removal is carried out and the portion which was not irradiated is developed by the alkali developing solution. If the combination rate of the compound which has photopolymerization nature or an optical hardenability functional group exceeds 150 mass % to alkali solubility binder resin, it will be in the tendency for development nature to fall, and optical hardening of a paint film will become insufficient by less than 25 mass %.



[0034]As a photopolymerization initiator, the photopolymerization initiator of publicly known common use can be used. Specifically, for example Benzophenone, 4,4'-screw methylamino benzophenone, BenzoFENO, such as MIHIRAZU ketone; Xanthenes, such as xanthone and a thioxan ton, p-dimethylamino acetophenone, benzyl-4-dimethylamino benzoate, 4-bis-trichloromethyl 6-(4-ethoxy) phenyl-S-triazine, 2-amyl anthraquinone, beta-KURORU anthraquinone, biimidazole, etc. are mentioned.

[0035]As a commercial photopolymerization initiator, for example Made in Tiba Specialty Chemicals "IRGACURE 184", "IRGACURE 369", the "\*\*\*\*\*- 1173", and "\*\*\*\*\*- TPO" by BASF A.G. The "kaya cure DETX" by Nippon Kayaku Co., Ltd., "kaya cure OA", and "Vicure 10" by a stufa company. "Vicure 55" and Akzo -- there is made in "DEPU" Kurogane Chemicals by "Sun Delay 1000" Upjohn by the shrine "TORIGO knurl PI" sand company "biimidazole" etc.

[0036]The photosensitizer of publicly known common use can also be used together to the above-mentioned photopolymerization initiator. As a photosensitizer, the compound etc. which have a nitrogen atom of amine, urea, the compound that has a sulfur atom, the compound which has a phosphorus atom, the compound which has a chlorine atom, nitrile, or others are mentioned, for example. Using independently can also be used for these combining two or more sorts.

[0037]Although the combination rate in particular of a photopolymerization initiator is not limited, its range of 0.1 - 30 mass % is preferred to the compound which has photopolymerization nature or an optical hardenability functional group. By less than 0.1 mass %, when it is in the tendency for the photosensitivity at the time of optical hardening to fall, 30 mass % was exceeded and the paint film of a pigment dispersion resist is dried, the crystal of a photopolymerization initiator may deposit and deterioration of film properties may be caused.

[0038]As a solvent used for a pigment dispersion resist, for example Propylene-glycol-monomethyl-ether acetate, Acetate system solvents, such as propylene glycol monoethyl ether acetate, Ketones, such as ethers solvents, such as aromatic solvents, such as propionate system solvents, such as ethoxy propionate, toluene, and xylene, and butyl cellosolve, and methyl ethyl ketone, etc. can be used. These solvents can be used combining two or more sorts, even if independent one sort.

[0039]In the pigment dispersion constituent and pigment dispersion resist of this invention, additives of publicly known common use, such as a pigment derivative, a color, resin, a coupling agent, a leveling agent, a defoaming agent, an antioxidant, and a stabilizer, can be added in the range which does not spoil the effect of this invention if needed.

[0040]Combination of the pigment dispersion resist of this invention Phthalocyanine (A) and the yellow pigment 4 - 12 mass %, It is preferred to add an additive 0.8 to dispersant 9 mass %, three to alkali solubility binder resin 15 mass % which has an acidic group, 0.8 to optical hardenability constituent 23 mass %, 0.1 to photopolymerization initiator 7 mass %, a solvent, and if needed, and to make a nonvolatile matter into the range of 20 - 30 mass %.

[0041]Generally, a light filter is created through the following processes. All over the side which established the black matrix of the

substrate for light filters for the pigment dispersion resist, spreading and after carrying out stoving (prebaking), the optical cured film layer of a pigment dispersion resist is formed in a picture element part by irradiating with and developing ultraviolet radiation or visible light through a photomask. The same operation is repeated 3 times for every color, and the light filter which has red and a green and blue (or cyanogen, Magenta, yellow) pixel in a predetermined position is created. After that, if needed, the whole light filter can be heat-treated (postbake) and heat curing of the optical cured film layer of this pigment dispersion resist can be carried out further. the following -- the manufacturing method of the light filter of this invention -- the above -- although a general manufacturing method is made into an example and explained still in detail in order of a process, this invention is not limited to this.

[0042]There is no limitation in particular about the method of applying a pigment dispersion resist to the substrate face for light filters. As a coating method, publicly known methods, such as the printing method, a spray method, the roll coat method, the bar coat method, the curtain coat method, and a spin coat method, can be used, for example.

[0043]Although the drying condition of the paint film of the pigment dispersion resist applied to the substrate for light filters changes with the kind of each component, blending ratios, etc., it is 50-150 \*\* and is usually a for [ 1 to 15 minutes ] grade. Generally this heat-treatment is called "prebaking."

[0044]As a light used for optical hardening of a pigment dispersion resist paint film, it is preferred to use the ultraviolet radiation or visible light of the wavelength range of 200-500 nm. It is preferred that wavelength uses short energy-rich ultraviolet radiation especially. As a light source of ultraviolet radiation or visible light, what is widely used in the field of photofabrication can be used. Specifically, for example A low pressure mercury lamp, a high pressure mercury lamp, an extra high pressure mercury lamp, A halide lamp, a chemical lamp, a black light lamp, a mercury-xenon lamp, an excimer lamp, short arc light, a helium cadmium laser, argon laser, THG, a FHG light laser using Nd-YAG laser, etc. are mentioned. A pixel pattern can be directly drawn to a pigment dispersion resist paint film without using a photomask, when a laser is used as a light source.

[0045]Since the pigment dispersion resist of this invention has sensitivity also not only to the above-mentioned light but to electron rays, it can also draw a pixel pattern directly to a pigment dispersion resist paint film with electron rays as well as a laser. In this case, it is not necessary to necessarily blend a photopolymerization initiator into said optical hardenability constituent.

[0046]After carrying out light irradiation to the paint film of a pigment dispersion resist and printing a pixel pattern, as an alkali developing solution used when developing negatives, aqueous solutions, such as sodium hydroxide, potassium hydroxide, sodium carbonate, and trimethylammonium hydroxide, etc. can be used, for example. Into this alkali developing solution, adequate amount addition of water soluble organic solvents, such as methanol, ethanol, and isopropanol, and the surface active agent may be carried out.

[0047]Any, such as a liquid peak method, the dipping method, and a

spray method, may be sufficient as a developing method. It washes after development and is made to dry. Although the pigment dispersion constituent and pigment dispersion resist of this invention are an object for green picture element parts, generally, they repeat the above-mentioned operation 3 times for every color, and create the light filter which has an optical cured film layer of red and a green and blue pigment dispersion resist in the picture element part of a predetermined position, respectively. The obtained light filter with heating apparatus, such as a hot plate and oven, [ 100-280 °C ] Heat curing of the unreacted DPHA which remains in the optical cured film of a pigment dispersion resist is carried out, and a light filter is completed at the same time it removes the volatile component in a paint film by carrying out predetermined time heat-treatment (postbake). The green picture element part of the light filter of this invention pass the above-mentioned process is excellent in transparency, color purity, and the depth of shade.

[0048]

[Working example]A work example is used for below and this invention is explained to it still in detail. Especially a "part" and "%", as long as there is no notice, a "mass part" and "mass %" are expressed, respectively.

[0049](Work example 1) Primary particle diameter to the high-speed dispersion machine by the Igarashi machine production company "TSC-6H" which prepared zirconia beads 0.5 mm in diameter, [ 35-45 nm ] 15 copies of zinc halide phthalocyanine of the following average composition, acrylic dispersant "BYK-2001" by big KEMI 4.5 copy, 80.5 copies of propylene glycol monoethyl ether acetate (it is hereafter written as PGMAc) was taught, it agitated by per minute 2000 revolutions for 8 hours, and the green pigment dispersed composition (G-1) was obtained.

[0050]M:ZnY[ in the <average composition of zinc halide phthalocyanine> aforementioned general formula ] :-less X: Bromine (number of substitution 13), chlorine (number of substitution 2)

m:15[0051][ subsequently the high-speed dispersion machine "TSC-6H" which prepared zirconia beads 0.5 mm in diameter ] 15 copies, acrylic dispersant "BYK-2001" by big KEMI 4.5 copy, and 80.5 copies of PGMAc(s) were taught, the C.I. pigment yellow 150 whose primary particle diameter is 35-45 nm was agitated by per minute 2000 revolutions for 8 hours, and the yellow pigment dispersion constituent (Y-1) was obtained.

[0052]53 copies of green pigment dispersed compositions (G-1) and 47 copies of yellow pigment compositions (Y-1) were mixed, and the pigment dispersion constituent for light filters of this invention was obtained.

[0053]These 100 copies of pigment dispersion constituents for light filters, the PGMAc solution of alkali solubility binder resin by the Dainippon Ink chemicals company "EKUSEDIKKU LC-295" (nonvolatile matter: 40%) The acid number of a solution : 31.3 copies of 33 mgKOH/g, dipentaerythritol hexaacrylate. (It is hereafter written as DPHA.) 12.5 copies and Tiba Specialty Chemicals photopolymerization initiator "IRGACURE #369" 0.3 copy, After mixing 17.1 copies of PGMAc(s), it filtered using the filter with the

aperture of 1.0 micrometer, and the pigment dispersion resist for light filters of this invention was obtained.

[0054](Work example 2) Green pigment dispersed composition (G-2) \*\*\*\* was obtained like the work example 1 instead of 15 copies of zinc halide phthalocyanine in the work example 1 except having used 15 copies of halogenation nickel phthalocyanine of the following average composition.

[0055]M:NiY[ in the <average composition of halogenation nickel phthalocyanine> aforementioned general formula ] :-less X: Bromine (number of substitution 13), chlorine (number of substitution 2)  
m:15[0056]45 copies of green pigment constituents (G-2) and 55 copies of yellow pigment compositions (Y-1) were mixed, and the pigment dispersion constituent for light filters of this invention was obtained.  
[0057]Subsequently, these 100 copies of pigment dispersion constituents for light filters, "EKUSEDIKKU LC-295" 31.3 copy, After mixing 12.5 copies of DPHA(s) and "IRGACURE #369" 0.3 copy, and 17.1 copies of PGMAc(s), it filtered using the filter with the aperture of 1.0 micrometer, and the pigment dispersion resist for light filters of this invention was obtained.

[0058](Comparative example) The green pigment dispersed composition (G-3) was obtained like the work example 1 instead of 15 copies of zinc halide phthalocyanine in the work example 1 except having used 15 copies of copper halide phthalocyanine of the following average composition.

[0059]M:CuY[ in the <average composition of copper halide phthalocyanine> aforementioned general formula ] :-less X: Bromine (number of substitution 13), chlorine (number of substitution 2)  
m:15[0060]Subsequently, 60 copies of green pigment dispersed compositions (G-3), 40 copies of yellow pigment dispersion constituents (Y-1), "EKUSEDIKKU LC-295" After mixing 31.3 copies, 12.5 copies of DPHA(s) and "IRGACURE #369" 0.3 copy, and 17.1 copies of PGMAc(s), it filtered using the filter with the aperture of 1.0 micrometer, and the pigment dispersion resist was obtained.

[0061]The following examination was done about the pigment dispersion resist for light filters obtained by the above-mentioned work examples 1 and 2 and a comparative example, and the pigment dispersion resist, and a result and evaluation were shown in Table 1 and drawing 1.

[0062]Each pigment dispersion resist obtained by the <depth-of-shade examination of pigment dispersion resist cured film layer> work example and the comparative example is dropped on a glass plate, 60 \*\* after x and y value in the CIE coloring system chromaticity of the pigment dispersion resist cured film layer after postbake carry out spin coating using a spin coater so that it may be set to x= 0.260 and y= 0.630 -- predrying during 5 minutes -- it prebaked and the pigment dispersion resist coated layer was formed. To this pigment dispersion resist coated layer, it lets the photomask for light filters pass, After irradiating with the light of 0.1 J/cm<sup>2</sup> using a high pressure mercury vapor lamp, diluted with pure water 30 times, and it was immersed into the alkali developing solution by AITESU "IDI9A.I. Artificial Intelligence" (tetramethylammonium hydroxide system) held at 30 \*\*, the pigment dispersion resist paint film of the unexposed part was made

to \*\*\*\*, and negatives were developed. It washed and was air-dry with pure water until the wash liquid became neutrality. Heat curing of the unreacted DPHA which carries out postbake for 30 minutes at 250 \*\*, and remains in the optical cured film layer of a pigment dispersion resist further after that was carried out, and the sample for a depth-of-shade examination was produced. The CIE coloring system chromaticity of the pigment dispersion resist cured film layer was measured using the Olympus microspectrophotometry device "OSP-SP-200."

[0063]About each sample for a depth-of-shade examination, the thickness of the pigment dispersion resist cured film layer after postbake was measured using the Japanese vacuum technical company tabulation surface form measuring apparatus "DEKTAK3." It was estimated that the depth of shade was high, so that  $x = 0.260$  and the thickness used as  $y = 0.630$  were thin. The result was shown in Table 1.

[0064]Y value in CIE coloring system chromaticity was measured using the microspectrophotometry device "OSP-SP-200" about the pigment dispersion resist cured film layer of the sample for the <transparency [ of a pigment dispersion resist cured film layer ] test> above-mentioned depth-of-shade examination. It was estimated that transparency was high, so that Y value was large. The result was shown in Table 1.

[0065]Using a spin coater, each pigment dispersion resist obtained by the <color purity examination of pigment dispersion resist cured film layer> work example and the comparative example is dropped on a glass plate, carry out spin coating, and, [ future processes ] The thickness of the pigment dispersion resist cured film layer after postbake produced 2.0 and the 2.5 or 3.0-micrometer sample for a color purity examination like the manufacturing method of the sample for a depth-of-shade examination, respectively.

[0066]y value in a CIE coloring system was measured using the microspectrophotometry device "OSP-SP-200" about the pigment dispersion resist cured film layer of the sample for a color purity examination. The result was shown in drawing 1. It was estimated that color purity was high, so that y value was high.

[0067]

[Table 1]

表 1

			実施例 1	実施例 2	比較例 1
顔 料 分 散 レジスト	緑色顔料分散組成物	(種類)	G-1	G-2	G-3
		(部)	53	45	60
	黄色顔料分散組成物	(種類)	Y-1	Y-1	Y-1
		(部)	47	55	40
	アルカリ可溶性ベンゾイン樹脂溶液	(部)	31.3	31.3	31.3
	光重合性単量体	(部)	12.5	12.5	12.5
	光重合開始剤	(部)	0.3	0.3	0.3
顔 料 分 散 レジスト 硬化塗膜	溶剤	(部)	17.1	17.1	17.1
	膜厚	( $\mu$ m)	2.7	2.9	3.7
	透明性	Y 値	45.5	44.9	43.6
		x 値	0.26	0.26	0.26
		y 値	0.63	0.63	0.63

[0068]Compared with the case where copper halide phthalocyanine and a yellow pigment are used, it is clear from the result shown in Table 1 the green picture element part's of a light filter which has a pigment dispersion resist cured film layer which uses phthalocyanine (A) and a yellow pigment to excel in transparency and the depth of shade.

[0069]Compared with the case where copper halide phthalocyanine and a yellow pigment are used, it is clear from the result shown in drawing 1 the green picture element part's of a light filter which has a pigment dispersion resist cured film layer which uses phthalocyanine (A) and a yellow pigment to excel also in color purity.

[0070]

[Effect of the Invention]The pigment dispersion resist which added the pigment dispersion constituent containing the halogenation metal phthalocyanines denoted by said general formula and a yellow pigment is used, The green picture element part of the light filter of this invention produced with the photolithographic method is excellent in the depth of shade, transparency, and color purity compared with what uses conventional copper halide phthalocyanine and yellow pigment.

[Translation done.]